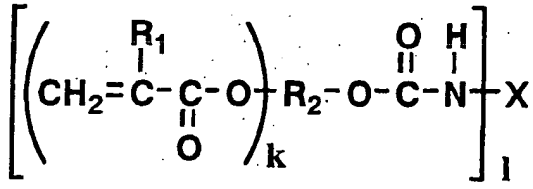
refractive index than that of a binder resin for said hard coat layer and a polymer polymerizing a urethane(meth)acrylate compound having the chemical formula



wherein R_1 is hydrogen or methyl; R_2 is a component, excluding hydroxyl groups, from a polyhydric alcohol; X is a component, excluding isocyanate groups, from an isocyanate compound; k is an integer of 1 to 5; and 1 is an integer of 1 to 3, with the proviso that k and 1 cannot both be 1.

REMARKS

The outstanding Official Action objects to the specification and rejects all the claims currently in this application on formal and/or substantive grounds. Applicants have amended the specification and claims and respectfully submits that the present application is patentable over the objection and rejections of record.

Turning first to the objection to the specification, the Official Action states that chemical formulae 3, 4, 6 and 8 are incorrect. Suffice it to say, the crux of this argument resides in the formulae including linkages of two isocyanate groups. In fact, the Official Action continues, the examples emphasize that the urethane(meth)acrylate compound of the current application is formed by reacting acrylate compounds, such as pentaerithrytol triacrylate and pentaerythritol tetraacrylate, with various isocyanate compounds.

Applicants have amended the specification wherein the aforementioned formulae are set forth to correct the obvious error pointed out in the outstanding Official Action. This

correction has been accomplished by redefining X. As amended, X is defined as a component, excluding isocyante groups, from an isocyanate compound. As such, the inaccuracy noted in the Official Action is overcome.

It is emphasized that this amendment to the specification adds no new matter thereto. Rather, it corrects an obvious error, as pointed out in the outstanding Official Action. Indeed, the Official Action indicates that appropriate correction is required. Such has been done in the amendment to the specification.

Three formal grounds of rejection are imposed in the outstanding Official Action. The first of these, directed to Claims 7-9 and 13, is imposed under 35 U.S.C. §112, first paragraph. Claims 7-9 and 13 stand rejected as containing subject matter which is not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor, at the time the application was filed, had possession of the claimed invention.

It is unnecessary to discuss in detail the basis for this rejection. Suffice it to say, the rejection is predicated upon the incorrect formula of Claim 13, from which Claims 7-9 depend, wherein two isocyanate groups are linked together.

Applicants have amended Claim 13 by reciting the aforementioned new definition of X. Insofar as X excludes an isocyanate group from being within its meaning, the above discussed ground of rejection, imposed under 35 U.S.C. §112, first paragraph, is overcome.

The second formal ground of rejection is imposed under 35 U.S.C. §112, second paragraph. That rejection is directed to Claim 13 as being indefinite.

Claim 13 stands rejected for its inclusion of the indefinite term "high." Claim 13 has been amended to replace the indefinite term "high" with the clearer adjective --higher--. In addition, a comparison to a binder resin for the hard coat layer is added to indicate that the

ultrafine particles have a higher reflective index than that of a binder resin for the hard coat layer. This comparison clearly overcomes the indefiniteness of preamended Claim 13. This amendment to Claim 13, which overcomes the aforementioned formal rejection, is fully supported by the originally filed specification at Page 19, lines 3-4.

The third and final formal ground of rejection is directed to Claim 7. Claim 7 stands rejected, under 35 U.S.C. §112, second paragraph, as being indefinite. Specifically, Claim 7 requires the hard coat layer to have a particle size of 30 nm or less. The Official Action correctly queries how a film coating can have a particle size. The examiner indicates that he believes that applicants intended that it be ultrafine particles that have the particle size recited in Claim 13. The examiner is correct and Claim 7 has been amended accordingly to correct this obvious typographical error.

Two substantive grounds of rejection are imposed in the outstanding Official Action. The first of these is directed to Claims 1, 3-5, 10 and 12. These claims stand rejected, under 35 U.S.C. §103(a), as being unpatentable over U.S. Patent 5,747,152 to Oka et al. in view of Japanese Patent Publication 10-047632 to Ishii et al.

Claim 1 and Claims 3-5, which each depend from Claim 1, as well as Claim 10, from which Claim 12 depends, describe an anti-reflection material which comprises a transparent substrate, a hard coat layer provided on one or both surfaces of the transparent substrate and an anti-reflection layer having a lower refractive index than the hard coat layer. The Official Action avers that Oka et al. teaches an anti-reflection film which includes these components. Furthermore, the Official Action continues, Oka et al. teaches that UV curable resins containing acrylate functional groups are suitable for use as the binder resin of the hard coat layer. Furthermore, urethane acrylates are preferred. The Official Action admits, however,

that Oka et al. fails to teach a hard coat layer that comprises a copolymer of a urethane methacrylate wherein the methacrylate compound has a fluorene structure. It is for this reason that the Ishii et al. reference is applied for its teaching of a resin composition that comprises a urethane methacrylate formed by reacting a polyol having a fluorene structure with a polyisocyanate compound and a hydroxylated methacrylate.

Applicants have amended Claim 1 to recite the generic chemical formula of the urethane(meth)acrylate compound, including the meaning of the variables recited therein. This further recitation emphasizes that the anti-reflection material of Claim 1 provides superior anti-reflection properties on a display. This anti-reflection material provides clear images having superior image contrast and superior durability even when employed for outside use. It is unnecessary to discuss these advantages in detail insofar as the specification, at Page 5, line 8 to Page 6, line 2, sets forth these advantages in greater detail.

The anti-reflection film of Oka et al., on the other hand, includes a transparent substrate, a hard coat formed on the transparent substrate and a secondary coating disposed on the hard coat layer. The secondary coating utilized in Oka et al. has a lower refractive index than the hard coat layer.

The anti-reflection film of Oka et al., however, does not provide the superior impact, wear and chemical resistance obtained by including a copolymer formed by the copolymerization of a (meth)acrylate compound having a fluorene structure and the specific urethane(meth)acrylate compound of the hard coat layer, as set forth in Claim 1. As such, a combined teaching of Oka et al. and Ishii et al. does not make obvious any of the claims subject to rejection over its combined teaching.

A second embodiment of the present invention, set forth in Claim 10, from which Claim 12 depends, has similarly been rejected over the combined teaching of Oka et al. in view of Ishii et al. Claim 10 sets forth an anti-reflection material which comprises a transparent substrate, a hard coat layer provided on one or two surfaces of the transparent substrate directly or via another layer and an anti-reflection film further provided on the surface of the hard coat layer. The hard coat layer in this embodiment comprises at least one radiation and/or thermosetting resin and titanium oxide ultrafine particles which are surface-treated by an oxide or a hydroxide of at least one element selected from the group consisting of silicon, zirconium, aluminum, tin and cesium. In this embodiment the titanium oxide has a rutile-type crystal structure. It is noted that the recitation of a titanium oxide having a rutile-type structure is supported by the originally filed specification at Page 34, lines 8-14.

In the rejection of Claim 10, the Official Action admits that Oka et al., the principal reference, does not teach that the hard coat layer be radiation curable and/or thermosetting. Thus, Ishii et al. is applied for its teaching of a resin material curable by visible, ultraviolet or infrared radiation.

Applicants submit that this combination does not create any prima facie case of obviousness. Even if it did, any prima facie case of obviousness created by the combined teaching of Oka et al. and Ishii et al. is rebutted by the voluminous number of examples and comparative examples which emphasize the unexpectedly improved anti-reflection properties, wear resistance, chemical resistance, light resistance and superior image contrast provided by the anti-reflection material of Claim 10 over those of the prior art of which Oka et al. is an example.

The second substantive ground of rejection is directed to Claims 7-9 and 13. These claims stand rejected, under 35 U.S.C. §102(a), as being unpatentable over Oka et al. in view of U.S. Patent 5,880,171 to Lim et al.

Without going into the details of the basis of this rejection it is enough to say that the Official Action argues that Oka et al. teaches an anti-reflection film which meets all the limitations of independent Claim 13 but for the composition of the hard coat layer, which includes a urethane methacrylate having the chemical formula set forth in Claim 13.

To overcome this critical deficiency in Oka et al. the Official Action applies Lim et al. as a secondary reference. The Official Action submits that Lim et al. teaches a polymeric composition for an ophthalmic lens that includes a urethane acrylate having the structural formula set forth at Column 7, lines 20-24.

It is apparent that the difunctional or trifunctional urethane prepolymer relied upon in Lim et al, at Column 7, lines 20-24, is distinguished from the urethane methacrylate compound recited in Claim 13. This is to be expected in view of the totally different functionality to which this compound is put. Ophthalmic lenses are clearly distinguished from anti-reflection materials. Therefore, it is unsurprising that the anti-reflection material of the present application provides superior properties, as discussed above, compared to anti-reflection materials of the prior art exemplified by Oka et al.

The aforementioned remarks assume that a prima facie case of obviousness is presented by the combined teaching of Oka et al. and Lim et al. However, applicants respectfully submit that it would not be obvious to one skilled in the art to look to a teaching in a reference directed to ophthalmic lenses when the aim is to produce an anti-reflection material.

Stated differently, even if the formula at Column 7 of Lim et al. were identical to the urethane methacrylate compound recited in Claim 13, which is not the case, still the use of this teaching evidences an appropriation of the present invention to make obvious its disclosure. That is, even if the formula in Lim et al. were identical to the urethane methacrylate recited in Claim 13, one skilled in the art would not look to its teaching for guidance in the formation of an anti-reflection material supplementary to the anti-reflection film taught in Oka et al. The prepolymer taught by Lim et al. is used in an application totally removed from that of an anti-reflection material. As such, the combination of its teaching with the principal Oka et al. reference is improper. Again, applicants submit that even if the prepolymer of Lim et al. was identical to the urethane methacrylate compound of Claim 13, which is not the case, and even if the combination were permissible, which again is not the case, still the showing of unexpected results for the anti-reflection material, as evidenced by the comparison between examples within and comparatable examples outside the present invention, establish the patentability of Claim 13, as well as Claims 7-9, which each depend from Claim 13.

The above extended remarks establish the patentability of the amended claims over the substantive grounds of rejection imposed in the outstanding Official Action. Reconsideration and removal of these grounds of rejection are therefore deemed appropriate. Such action is respectfully urged.

The above amendment and remarks establish the patentable nature of all the claims currently in this application. Notice of Allowance and passage to issue of these claims,

Claims 1, 3-5 and 7-13, is therefore respectfully solicited.

Respectfully submitted,

Marvin Bressler
Registration No. 25,132
Attorney for Applicants

Scully, Scott, Murphy & Presser
400 Garden City Plaza
Garden City, New York 11530
516-742-4343
MB:ml

APPENDIX

RENDITION OF AMENDMENT OF APPLICATION SHOWING CHANGES MADE

IN THE SPECIFICATION:

Amendment of the paragraph beginning at Page 11, line 9:

In the chemical formulas, R refers to a polyhydric alcohol group; R_1 refers to a hydrogen atom, CH_3 or C_2H_5; R_2 refers to a hydrogen atom or CH_3; X refers to a component, excluding isocyanate groups, from an isocyanate compound [group]; and Y refers to a polyhydric alcohol group. a and b refer to integers of 1 to 5; k refers to integers of 2 to 5; l refers to integers of 2 to 3; m refers to integers of 1 to 2; and n refers to integers of 2 to 6.

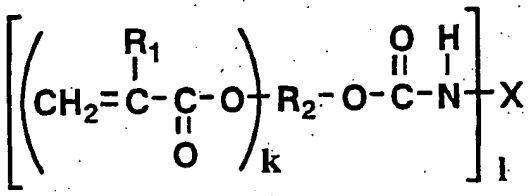
Amendment of the paragraph beginning at Page 23, line 3:

In the chemical formulas, R_1 refers to a hydrogen atom or CH_3; X refers to a component, excluding isocyanate groups, from an isocyanate compound [group]; and R_2 and Y refer to polyhydric alcohol [group] groups. k refers to integers of 1 to 5; l refers to integers of 1 to 3; m refers to integers of 1 to 2; and n refers to integers of 1 to 6. k and l cannot both be 1 nor can k, l, and m all be 1 at the same time.

IN THE CLAIMS

Claim 1 (Twice Amended): An anti-reflection material comprising a transparent substrate, a hard coat layer provided on one surface or two surfaces of said transparent substrate directly or via another layer, and an anti-reflection film having a lower refractive index than said hard coat layer further provided on a surface of said hard coat layer, wherein said hard coat layer comprises a polymer [copolymer] copolymerizing at least a

(meth)acrylate [(metha)acrylate] compound having a fluorene structure and a urethane(meth)acrylate [urethane(metha)acrylate] compound having the chemical formula



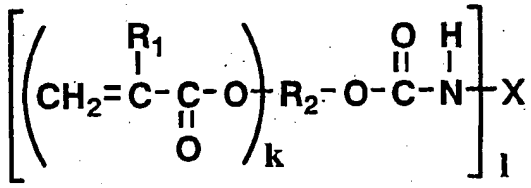
wherein R_1 is hydrogen or methyl; R_2 is a component excluding hydroxyl groups from a polyhydric alcohol; X is a component, excluding isocyanate groups, from an isocyanate compound; k is an integer of 1 to 5; and 1 is an integer of 1 to 3, with the proviso that k and 1 cannot both be 1.

Claim 7 (Twice Amended): An anti-reflection material as recited in claim 13, wherein said ultrafine particles have [hard coat layer has] a particle size of 30 nm or less.

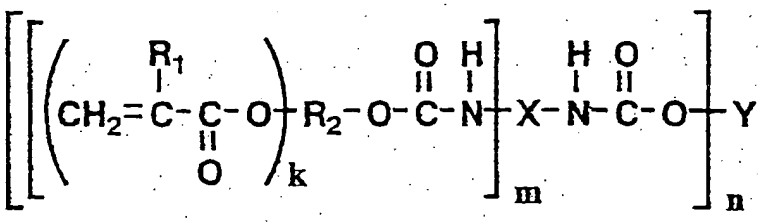
Claim 10 (Twice Amended): An anti-reflection material comprising a transparent substrate, a hard coat layer provided on one surface or two surfaces of said transparent substrate directly or via another layer, and an anti-reflection film further provided on a surface of said hard coat layer, wherein said hard coat layer comprises at least one radiation and/or thermosetting resin and titanium oxide ultrafine particles [particle] which is surface-treated by an oxide or a hydroxide of at least one element selected from the group consisting of silicon, zirconium, aluminum, tin, and cesium, wherein said titanium oxide has a rutile-type crystal structure.

Claim 13 (Amended): An anti-reflection material comprising a transparent substrate, a hard coat layer provided on one surface or two surfaces of said transparent substrate directly or via another layer, and an anti-reflection film consisting of one layer or multi-layers having an adjusted refractive index further provided on a surface of said hard coat layer, wherein said hard coat layer comprises ultrafine particles having a [high] higher refractive index than that of a binder resin for said hard coat layer and a polymer polymerizing a urethane(meth)acrylate [urethane(metha)acrylate] compound having the chemical formula

(2)



wherein R_1 is hydrogen or methyl; R_2 is a component, excluding hydroxyl groups, from a polyhydric alcohol; X is [an] a component, excluding isocyanate [group] groups, from an isocyanate compound; k is an integer of 1 to 5; and l is an integer of 1 to 3, with the proviso that k and l cannot both be 1 [or



wherein R_1, X and k have the meanings given above; Y is a polyhydric alcohol group; m is an integer of 1 or 2; and n is an integer of 1 to 6, with the proviso that k, l and m cannot all be 1].